



**Safety**

**MACDILL AIR FORCE BASE  
CONFINED SPACES PROGRAM**

**COMPLIANCE WITH THIS PUBLICATION IS MANDATORY**

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This instruction implements AFD 91-3, *Occupational Safety and Health*; AFOSH Standard 91-25, *Confined Spaces*; and 29 CFR 1910.146, *Permit Required Confined Spaces*. This instruction provides guidance for establishing a confined space program that covers entering and working in confined areas. The program will apply to all personnel whose duties require them to enter and work in these areas. Personal safety is paramount and at no time should it be compromised. Therefore, each unit or organization shall establish a written confined space entry program in accordance with AFOSH Standard 91-25 and 29 CFR 1910.146. Fuel Cell Repair is governed by Technical Order 1-1-3, *Inspection and Repair of Aircraft Integral Tanks and Fuel Cells*.

**SUMMARY OF REVISIONS**

This instruction replaces MACDI 91-300, *MacDill Air Force Base Confined Spaced Program*. It corrects and updates office symbols due to wing reorganization; deletes paragraph 3.4.6. and renumbers remaining paragraphs accordingly; and changes BIO to BES throughout. **A bar ( | ) indicates new or revised material.**

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## 1. References.

- 1.1. AFOSH Standard 91-25.
- 1.2. 29 CFR 1910.146.
- 1.3. 29 CFR 1910.268, *Telecommunications*.

## 2. Definitions.

### 2.1. Confined Space - A space that:

- 2.1.1. Is large enough and so configured that an employee can bodily enter and perform assigned work;
- 2.1.2. Has limited or restricted means for entry and exit (for example: tanks, vessels, storage bins, hoppers, vaults and pits); and
- 2.1.3. Is not designed for continuous human occupancy.

### 2.2. Permit-Required Confined Space - A confined space that has one or more of the following characteristics:

- 2.2.1. Contains or has the potential to contain a hazardous atmosphere. Classification must take into consideration the probability factors when classifying a confined space.
- 2.2.2. Contains a material that has the potential for engulfing the entrant;
- 2.2.3. Has an internal configuration such that the entrant could be trapped or asphyxiated by inwardly converging walls or by a floor that slopes downward and tapers to a smaller cross section.
- 2.2.4. Contains any other recognized serious safety and health hazard.

### 2.3. Non-Permit Confined Spaces - A space that does not contain or, with respect to atmospheric hazards, have the potential to contain any hazard capable of causing death or serious physical harm.

## 3. Responsibilities.

### 3.1. Confined Space Program Team (CSPT) will:

- 3.1.1. Be comprised of 6th Air Mobility Wing, Wing Safety (6 AMW/SEG), 6th Civil Engineer Squadron, Fire Department (6 CES/CEF), 6th Aerospace Medicine Squadron, Bioenvironmental Engineering (BE) (6 AMDS/SGPB), and functional managers.
- 3.1.2. Assist supervisors in classifying confined spaces located on base according to the above definitions of permit required and non-permit required spaces.
- 3.1.3. Assist organizations with developing a Master Entry Plan (MEP) for recurring entries having the same conditions and entry requirements. The plan must be evaluated and approved by the CSPT.
- 3.1.4. Determine atmospheric monitoring requirements.
- 3.1.5. Review the confined space program during annual safety evaluations.
- 3.1.6. Periodically observe permit required entries covered under the MEP.

### 3.2. Organizations/Units will:

#### 3.2.1. Ensure a written confined space program is developed.

3.2.1.1. Ensure that Job Safety Analysis (Mission Risk Assessments) are completed for all confined space work.

3.2.1.2. Ensure a lockout/tagout operating instruction or program is included in the confined spaces program. Ensure a Warning Tag operating instruction or program is also included for aircraft maintenance.

3.2.2. Coordinate with 6 AMW/SEG, 6 CES/CEF, and 6 AMDS/SGPB to classify confined spaces. The classification will be based on the characteristics of the space, including oxygen levels, flammability, carbon monoxide levels, sulfur dioxide, hydrogen sulfide levels, and any other recognized safety and/or health hazard. Use the 138 question confined spaces survey to aid in the classification process. When completed, this survey becomes part of the unit confined space program.

3.2.3. Ensure that funds are included in their annual budget for initial and continuing confined space training and confined space equipment which includes personal protective equipment (PPE), monitoring equipment, and confined space extraction equipment.

3.2.4. Ensure MEP is annually reviewed, updated, and coordinated with the CSPT.

3.2.5. Designate entry supervisors for permit entry.

### 3.3. Squadron/Unit safety representatives will:

3.3.1. Maintain a master file of squadron MEPs (permit entry only).

3.3.2. Maintain a list of squadron personnel qualified to enter confined spaces.

3.3.3. Maintain a list of personnel that require confined space training.

3.3.4. Provide a list of qualified entry supervisors to the CSPT and maintain within the workplace (permit entry only).

3.3.5. Maintain the squadron's expired permits on file for one year.

3.3.6. Maintain and provide Wing Safety a list of the squadron's confined spaces that includes location and type of space.

3.3.7. Maintain a list of the squadron's confined space equipment that includes type of equipment, the date the equipment was last calibrated or inspected, and next inspection calibration date for the equipment.

3.3.8. Maintain a list of chemicals used by the squadron in its confined spaces operations.

### 3.4. Work center and/or entry supervisor will:

3.4.1. Maintain the MEP for the shop (permit entry only).

3.4.2. Prepare entry permits and contact 6 AMW/SEG, 6 CES/CEF, and 6 AMDS/SGPB for all entries not covered by the MEP. Provide completed copies to CSPT members.

3.4.3. Issue permits in accordance with the MEP.

- 3.4.4. Revoke permits and contact 6 AMW/SEG when entry conditions are not consistent with the MEP.
- 3.4.5. Ensure the proper classification of the confined space being entered.
- 3.4.6. Reclassify confined spaces from non-permit to permit in accordance with appropriate guidelines contained in this instruction.
- 3.4.7. Determine if conditions are acceptable for entry into a confined space.
- 3.4.8. Make sure workers are properly trained and qualified in safe operating procedures, emergency procedures, proper use of PPE, and how to egress confined spaces.
- 3.4.9. Brief workers on the hazards of entry.
- 3.4.10. Inspect work areas, tools, and equipment to identify and correct hazards.
- 3.4.11. Make sure that all physical and atmospheric hazards are abated to a reasonable extent.
- 3.4.12. Select proper PPE with assistance from 6 AMW/SEG, 6 CES/CEF, and 6 AMDS/SGPB and make sure it is readily available and works properly for safe entry.
- 3.4.13. Make sure that emergency procedures have been developed and that emergency services are readily available.
- 3.4.14. Provide an attendant for each permit entry.
- 3.4.15. Provide appropriate barriers to vehicles and pedestrians to protect the entry party.
- 3.5. Entrants will:
  - 3.5.1. Fully understand entry and egress procedures.
  - 3.5.2. Follow safe work practices and immediately notify the supervisor when an unsafe condition is identified.
  - 3.5.3. Notify entry supervisor if he or she is ill or on medication of any type.
- 3.6. Attendants will:
  - 3.6.1. Maintain an accurate count of all personnel entering and exiting the space.
  - 3.6.2. Maintain continuous communications with the entrants.
  - 3.6.3. Order entrants to evacuate when an unsafe condition occurs.
  - 3.6.4. Notify emergency services when required.
  - 3.6.5. Remain outside the space until all entrants have exited the space or unless replaced by a qualified attendant.
  - 3.6.6. Keep unauthorized persons from entering the space.
  - 3.6.7. Not perform any rescues that require entry until the rescue team has been notified and assistance has arrived.

**NOTE:** Would-be rescuers comprise over 50 percent of all confined space fatalities.

#### 4. Training.

4.1. Training is a vital part of every confined space program. All personnel whose duties require them to enter and work in these spaces shall be trained.

4.2. Personnel who perform duties as confined space entry supervisors, attendants, and entrants will be trained on the criteria outlined in this instruction and the squadron's written program and or operating instruction (OI).

4.3. Entrants shall be trained on:

- 4.3.1. The duties outlined in paragraph 3.5. of this instruction.
- 4.3.2. Hazard recognition and hazard abatement.
- 4.3.3. The proper use of PPE and barriers.
- 4.3.4. Self-rescue.
- 4.3.5. The effects and signs of exposure to hazardous atmospheres.
- 4.3.6. Special work practices or procedures.
- 4.3.7. Monitoring equipment and monitoring protocols.
- 4.3.8. Ventilating techniques.

4.4. Entry supervisors shall be trained on:

- 4.4.1. The duties outlined in paragraph 3.4. of this instruction.
- 4.4.2. The effects and signs of exposure to hazardous atmospheres.
- 4.4.3. The effective use of retrieval equipment.
- 4.4.4. Attendants' and entrants' training requirements.
- 4.4.5. Ventilating techniques.
- 4.4.6. Monitoring equipment and monitoring procedures.
- 4.4.7. Rescue communication techniques, i.e., who to call if a confined space emergency occurs and by what means.

4.5. Attendants shall be trained on:

- 4.5.1. The duties outlined in paragraph 3.6. of this instruction.
- 4.5.2. The effective use of retrieval equipment.
- 4.5.3. Entrants' training requirements which include special confined space work practices and procedures.
- 4.5.4. Ventilating techniques.
- 4.5.5. Monitoring equipment and monitoring procedures.
- 4.5.6. Rescue communication techniques, i.e., who to call if a confined space emergency occurs and by what means.
- 4.5.7. The effects and signs of exposure to hazardous atmospheres.

4.6. Each organization shall ensure funds are set aside to send personnel to formal confined space training and/or send personnel through the Wing Safety confined space class.

4.6.1. Wing Safety training for the base populace may be limited to supervisors.

4.6.2. Bioenvironmental Engineering will provide training on the pre-use, calibration, use, and care of atmospheric testing and monitoring equipment, and certify personnel required to test atmospheric conditions in confined spaces.

4.6.3. All training shall be documented on AF Form 55, **Employee Safety and Health Record**.

## 5. General Requirements.

5.1. Entry permits are only good for one shift.

5.1.1. Although specific directives and technical guidance may dictate certain confined space actions, those procedures must be tailored to meet the requirements of AFOSH Std 91-25 and 29 CFR 1910.146.

5.1.2. All confined spaces designated as permit-required shall be labeled to comply with federal standards. The label/sign shall read – “DANGER-Confined Space; Entry by Permit Only.” Labels/signs are required when entry into the space can be made without the use of tools to gain entry.

### WARNING SIGN EXAMPLE

<p style="text-align: center;">DANGER</p> <p style="text-align: center;">Permit-Required Confined Space</p> <p style="text-align: center;">DO NOT ENTER</p> <p style="text-align: center;">CS Identification No. _____</p> <p style="text-align: center;">To Obtain Permit, Contact:</p> <p style="text-align: center;">Safety Department: 828-3385 (0700-1630,M-F)</p> <p style="text-align: center;">Fire Department: 828-3630 (All Other Times)</p>
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5.1.3. An AF Form 1024, **Confined Spaces Entry Permit**, shall be completed and used whenever a permit-required confined space is to be entered.

5.1.4. For permit-required spaces, 6 AMW/SEG, 6 CES/CEF, and 6 AMDS/SGPB must visit the sites and verify all requirements are met prior to signing off on the permit. The coordinating agencies will only sign completed entry permits.

**EXCEPTION:** Under the MEP, the entry supervisor can issue a permit for recurring entries having the same conditions.

5.1.5. The permit shall be maintained at the work site until the work is completed or the permit expires.

5.1.6. When the work is completed, permits will be placed on file and maintained by the organization that entered the confined space. Completed permits will be kept on file for one year by the squadron/unit safety representative.

5.2. All permits must be evaluated at the end of each fiscal year by the organization that initiated the permit to determine potential problems with confined spaces.

**6. Pre-Entry Confined Space Evaluation.** Entry supervisors must plan in order to make successful confined space entries. Supervisors must consider the following before allowing personnel to enter confined spaces:

6.1. Determine if any solvents will be taken into the space.

6.2. Determine if any of the solvents have a low flash point.

6.3. Determine if the use of solvents necessitates the use of forced air ventilation. BES should be consulted when determining if forced air ventilation will be used and how long the unit must be run before entry.

6.4. If forced air ventilation is used, determine how the unit and its ducting must be placed to get adequate breathable air to entrants.

6.5. Review Material Safety Data Sheets (MSDS) on the chemicals that will be used in the space. BES shall be notified of all products used in the confined space. BES will recommend appropriate controls.

**NOTE:** MSDSs do not always adequately address the hazards of the product, especially when used in a confined space.

6.6. Determine if conditions outside of the space may affect entrants inside.

6.7. Determine if non-sparking tools will need to be taken into the space.

6.8. Determine the number of personnel that will be in the space at a time.

6.9. Determine the primary function of the confined space, i.e., storage tank, hopper, pit, etc.

6.10. Heavy motor vehicle traffic around the space that could generate carbon monoxide.

6.11. Chemical residues located on the walls and floor of the confined space that can liberate gases and vapors as the result of work processes in the space.

## **7. Atmospheric Monitoring.**

7.1. Monitoring shall be done according to the permit-required or the MEP. Monitoring of the atmosphere in a permit-required confined space shall be done prior to each entry as indicated in paragraph 7.2. below. Continuous monitoring during the entry must be performed.

7.1.1. Organizations that routinely enter confined spaces shall procure appropriate monitoring equipment. BES must approve all monitoring equipment before purchasing.

7.1.2. Organizations that enter confined spaces on an infrequent basis may request BES to complete required testing. BES equipment will not be loaned.



7.1.3. The individual who will be using the monitoring equipment shall be trained by BES in the operation and limitations of the monitoring equipment. This is required whether the organization owns the equipment or the equipment is borrowed.

7.2. At a minimum, confined spaces must be monitored for oxygen, flammability, and toxicity levels. Certain situations may also require monitoring for other constituents. These tests can be performed by the organization provided that they have the appropriate equipment and training. This monitoring is conducted by Bioenvironmental Engineering or the organization.

7.2.1. Frequency of monitoring will be determined by CSPT team and addressed on master entry plan.

7.2.1.1. If the atmosphere contains less than 19.5 percent oxygen, it is considered oxygen deficient and personnel are not allowed to enter the space. Personnel may only enter the space if the oxygen content is at 19.5 percent or greater. When atmospheric concentrations decrease below 20.6 percent oxygen, further evaluation may be necessary if the source of contamination is not known.

7.2.1.2. Oxygen Enriched Atmospheres: If the atmosphere contains more than 23.5 percent oxygen, it is considered an oxygen enriched atmosphere. These atmospheres make the conditions right for flash fires and personnel are not allowed to enter the space. When atmospheric concentrations of oxygen increase above 21 percent, further evaluation may be necessary if the source of the additional oxygen is not known.

7.2.2. Flammability Monitoring: This monitoring shall be measured before entry into confined spaces. Continuous monitoring must be conducted during the entire operation.

7.2.2.1. Lower Explosive Limit (LEL): Individuals should not enter the space if monitoring indicates levels at or greater than 4 percent of the LEL without investigating the cause of the higher readings. Atmospheres that are less than 10 percent of the LEL are too lean to burn. Nevertheless, when a space contains or produces measurable LEL readings below 10 percent, it might indicate that flammable vapors are being introduced or released in the space and could present a hazard in time. Therefore, the cause of the vapors must be investigated and, if possible, eliminated prior to entry.

7.2.2.2. Meters that measure LEL are calibrated using a specific gas. The LEL reading must be corrected for the hazard present in the confined space prior to interpreting the reading, unless the calibration gas is the same as the gas present. The operating manual of the instrument shall be consulted to determine how to perform this correction.

7.2.3. Monitoring for Certain Gases: Certain gases may be present in the confined space, depending on the situation. Many "confined space meters" have the capability of monitoring for these gases. If it is necessary to monitor for these gases, it will be indicated on the permit. BES shall determine if monitoring is necessary for these gases.

7.2.3.1. Hydrogen Sulfide Levels: The space must be tested for hydrogen sulfide levels. Hydrogen sulfide is a colorless gas that smells like rotten eggs and can disable entrants in seconds. Hydrogen sulfide is present in confined spaces from naturally occurring chemical reactions.

7.2.3.2. Sulfur Dioxide Levels: This gas also occurs in confined spaces from naturally occurring chemical reactions. Sulfur dioxide is also generated by the burning of hydrogen sulfide as

in welding operations.

7.2.4. Carbon Monoxide: Carbon monoxide is an odorless, colorless gas which is a byproduct of incomplete combustion of fuel. Anytime a generator or other source of carbon monoxide is present, monitoring for the gas shall be performed.

7.2.5. Toxicity Monitoring: There are many chemicals that may be present in confined spaces that were either present prior to entry or were brought in as part of the job. BES or the unit performs monitoring for toxicity. In most cases, this type of monitoring is more complex than other confined space monitoring and requires specialized equipment. BES must be contacted for more details.

### 7.3. Monitoring Procedures. General requirements.

7.3.1. The atmosphere of a confined space must be monitored according to strict procedures. If not, the readings may be inaccurate and the safety of entrants may be jeopardized.

7.3.2. Atmospheric readings are only valid for one 8-hour shift.

7.3.3. The atmosphere of the confined space will be re-tested after extensive breaks in the work process. For example, shift change, extensive breaks, and after lunch.

7.3.4. Monitoring will be done continuously while entrants are inside the confined space:

7.3.5. The continuous monitoring will be performed at the point of work operation.

7.3.6. Before any testing begins, the person using the instrument must be trained by BES.

### 7.4. The following procedure should be followed when monitoring confined spaces:

7.4.1. Test the air in a 5-foot area around the space for explosive gases and vapors.

7.4.2. Open the entry way to the space, but do not open it completely. Test the air around the opening of the space. Insert the hose a few feet into the space and monitor the atmosphere again. If the levels are safe, open the space completely and begin monitoring the inside of the space.

7.4.3. The space must be tested in the following sequence:

7.4.3.1. Test your oxygen levels first; next,

7.4.3.2. Test for the LEL; next,

7.4.3.3. Test for other gases as indicated on the MEP and/or the confined space entry permit.

7.4.3.4. Toxicity monitoring will be conducted by BES or the unit.

### 7.4.4. For vertical spaces, the following procedure must be followed:

7.4.4.1. Follow section 7.4.1. to 7.4.3.4.

7.4.4.2. Lower the hose into the space until it is 1 foot from the top and begin monitoring.

7.4.4.3. After the readings are complete, lower the hose 3 feet from the top and again begin monitoring. Monitoring must be done every 3 feet until the hose reaches the bottom of the space.

7.4.4.4. For every foot of hose, you should monitor at each level for 10 seconds. For example, if a monitor has a 10-foot hose, the operator should keep the hose at each 3-foot level for 100 seconds or 1.25 minutes.

7.4.5. For horizontal spaces:

7.4.5.1. Follow sections 7.4.1. to 7.4.3.4. If readings are acceptable for entry, enter the space.

7.4.5.2. Utilize a probe on the end of the monitor to test the air in front of you.

7.4.5.3. The atmosphere in front of the entrant will be tested in 2-foot increments. The probe will be held at each level for 10 seconds for every foot of hose.

7.4.5.4. The atmosphere must be tested until the entrant reaches the location inside the space where work will be performed.

7.5. Atmospheric Monitoring and Ventilation:

7.5.1. The space must be retested if ventilation equipment is used.

7.5.2. Test the space while the ventilation equipment is running. Test the dead air spaces around the ventilation stream.

**NOTE:** Ventilating a confined space may place its atmosphere in an explosive state. Also, atmospheric readings may be inaccurate if the space is tested while ventilating equipment is operating as personnel make the mistake of only testing the clean air stream produced by the ventilation equipment.

**8. Evaluate The Space To Determine If An Engulfment Hazard Is Present.**

8.1. Engulfment hazards exist when a confined space entrant can be surrounded and captured by a liquid or finely divided solid.

8.2. Engulfment kills confined space entrants because they breathe a liquid or finely divided solid into their lungs. As a result, the lungs become filled and plugged with the liquid or finely divided solid. Engulfment can also exert enough force on the body to cause death by strangulation, constriction, and crushing.

8.3. Examples of confined spaces that can cause engulfment include saw dust bins and spaces that contain water.

8.4. Engulfment hazards must be minimized through the use of life lines and retrieval systems.

**9. Evaluate The Space To Determine If It Has An Internal Configuration That Could Trap Entrants.** These spaces have areas that taper into small cross sections. Entrants become trapped in these small areas and their chest cannot expand because it is compressed.

9.1. If hazards may be introduced into the confined space due to "hot work," contact BES to evaluate the potential hazards and recommend ventilation procedures.

**10. Evaluate The Space To Determine If It Has Other Recognized Safety and Health Hazards.** Examples of recognized safety and health hazards include, but are not limited to, the following:

10.1. Slippery floors.

10.2. Electrical hazards.

10.3. Burn hazards from hot water pipes.

10.4. Biological hazards.

10.5. Heat extremes that can cause heat stroke/heat stress.

10.6. Fall hazards.

## **11. Entry Into Permit-Required Confined Spaces.**

11.1. These spaces contain atmospheres or conditions that are hazardous but not Immediately Dangerous To Life and Health (IDLH).

11.2. An entry permit approved by 6 AMW/SEG, 6 CES/CEF, and 6 AMDS/SGPB or an entry permit issued by an entry supervisor in accordance with the organizational MEP is required for entry.

11.3. Where contaminations are caused by materials or conditions within the space, the entry supervisor will identify sources and remove it to the maximum degree possible.

11.4. Operations creating hazards will be covered by the permit, and actions will be taken to minimize and control the hazards.

11.5. When toxic materials are or may be introduced into the space, the entry supervisor shall ensure proper respiratory protective devices are available and worn, when necessary, by workers.

11.6. Only explosion proof or intrinsically safe equipment is used where flammable or explosive atmospheres are present.

11.7. Entrants into a permit area will wear approved harnesses and lifelines that permit extraction. The lifeline will be attached to a fixed point outside the space. The lifeline will not be attached to vehicles or mobile equipment.

11.8. Entry supervisors will notify the base fire department's alarm control center that a permit-required confined space entry is in progress. Entrants must leave the space if rescue personnel must respond to an emergency unless the unit has its own rescue team on site.

11.9. Ensure an attendant is present for all permit entries.

11.10. If atmospheric conditions require, ventilation will be utilized to remove contaminants and provide air.

**NOTE:** Ventilation should run continuously even when workers exit the space for breaks.

11.11. Atmospheric monitoring shall be continuous throughout entry to ensure that conditions do not become IDLH.

11.12. The space shall be barricaded to prevent vehicles and pedestrians from interfering with entries.

## **12. Reclassification of Confined Spaces.**

12.1. An entry supervisor may reclassify a permit-required space as non-permit if approved by CSPT and it meets the following:

12.1.1. Atmospheric testing shows the space is free of hazards.

**NOTE:** Testing must be done outside of the space. If entry must be made to test the space, a permit is required for entry.

12.1.2. Actual or potential hazards are eliminated, and continuous monitoring is used to ensure that the atmosphere remains free of hazards.

12.1.3. During routine work, the entrant does not take tools or material into the space that could introduce a hazard.

12.1.4. The entrant does not perform any work that would cause a hazardous condition.

12.1.5. If conditions in the space become hazardous, the entry supervisor must evacuate and secure the space until an approved permit can be issued.

### **13. Entry Into Permit Required Spaces That Are IDLH.**

13.1. The CSPT will authorize entry and work in IDLH spaces.

13.2. All permit required confined spaces on MacDill Air Force Base must be tested and evaluated by entry supervisors prior to any confined space entry to determine if the space is a permit-required confined space. This evaluation is only valid for one 8-hour workshift.

13.3. The following conditions must be met for entry into IDLH atmospheres:

13.3.1. Efforts are made to reduce the hazard by isolation, ventilation, purging, inserting, or other techniques. If efforts are unsuccessful, entry is only authorized in cases of EXTREME EMERGENCY.

13.3.2. The entry permit must be approved by the CSPT prior to entry.

13.3.3. Workers entering the space shall wear a positive pressure self-contained breathing apparatus or airline respirator with a 20-minute escape bottle, harness, and lifeline. At no time will the Self-Contained Breathing Apparatus (SCBA) be taken off the back of the wearer while inside the space.

13.3.4. Emergency rescue personnel, equipped for extraction of workers, are stationed immediately outside of the space. Entrants must be removed from the space if rescue personnel must leave to respond to another emergency.

13.3.5. Communication is maintained at all times with entrants.

13.3.6. Only explosion proof or intrinsically safe equipment and non-sparking tools are used where flammable or explosive atmospheres are present.

13.3.7. A qualified safety official, fire protection specialist, and Bioenvironmental representative are present at the time of entry.

### **14. Entry Into Non-Permit Spaces.**

14.1. Entry into a non-permit confined space will require documentation that atmospheric testing was accomplished and shows the readings present at time of testing. No further testing is required if testing results are within limits specified in other parts of this publication. However, if you introduce any hazardous materials, perform any operation, or change any condition, the space must be reevaluated by the CSPT. Entry is authorized without a permit only when absolutely nothing has changed from the time it was evaluated by the CSPT and current testing shows no changes from the CSPT evaluation.

14.2. The space shall be barricaded to prevent vehicles and pedestrians from interfering with entries.

14.3. Even though the space is non-permit, it may be appropriate for entrants to use fall protection, radio communications, and other measures used for permit required confined spaces.

**15. Lockout/Tagout and The Control of Hazardous Energy (Warning Tag for Aircraft Maintenance).**

- 15.1. All hazardous energy sources will be isolated and controlled prior to entry.
- 15.2. The squadron's lockout OI and/or written program will be used to the fullest extent possible to protect confined space entrants from release of energy sources.
- 15.3. Consideration will be given to energy sources that exist in different forms to include:
  - 15.3.1. Electrical.
  - 15.3.2. Hydraulic.
  - 15.3.3. Water.
  - 15.3.4. Pneumatic.
  - 15.3.5. Mechanical.
  - 15.3.6. Springs.
  - 15.3.7. Radiation.
  - 15.3.8. Steam.
  - 15.3.9. Stored energy.
- 15.4. Whenever possible, locks must be used instead of tags.
- 15.5. Valve handles must be locked into place via a valve-locking device or padlock and chain.

**16. Contractor Operations.**

- 16.1. When contractors are required to perform work in confined spaces, the base contracting office shall ensure:
  - 16.1.1. The contractor has a written confined space program that meets the requirements of 29 CFR 1910.146 and shows verifiable proof that the contract employees have undergone confined space training.
  - 16.1.2. The contractor is informed that all confined spaces on MacDill Air Force Base are considered permit-required confined spaces until tested and evaluated. Contractors may reclassify the space in accordance with 29 CFR 1910.146 (c)(7)(i).
  - 16.1.3. The contractor knows that the base fire department performs confined space rescues.
  - 16.1.4. The contractor knows the phone number to the base fire department and knows how to properly summon a confined space rescue.
  - 16.1.5. Rescue procedures have been established.
  - 16.1.6. The contractor is briefed on the contents of each confined space in which they will be working. This brief should be conducted by the contract inspector and the affected squadron's safety representative.
  - 16.1.7. If the space does not belong to a particular squadron, contracting personnel must conduct the briefing with technical assistance from Safety, Fire Department, and Bioenvironmental Engi-

neering. This briefing must include a description of the space's hazards and the Air Force's past experience with the space.

16.1.8. At the end of the job, the contractor must conduct a debrief with a contract inspector to discuss the permit space program that was followed and hazards confronted or created during entry.

16.1.9. When Air Force personnel work in confined spaces with contract employees, entry operations will be coordinated. When there is a conflict between Air Force entry procedures and contractor entry procedures, Contracting, Safety, Fire Department, and Bioenvironmental Engineering will determine the correct entry procedures.

16.2. The 6 AMW/SEG reserves the right to terminate, at any time, any contractor confined space operations that place Air Force personnel or property in dangerous situations.

## **| 17. Communication (Permit Entry).**

17.1. Communication for confined space entries will take two forms. One form will be between the confined space entrant(s) and attendant. The other form of communication must be between the attendant and rescue personnel.

17.2. Entrant and Attendant Communication:

17.2.1. The entrant may communicate with the attendant visually and by voice if the entrant is in plain view and sight of the attendant. However, if the entrant must disappear around corners or excessive noise prohibits voice communication, radios must be used.

17.2.2. Radio communication can take the form of hand-held radios or headsets. The radios that are taken into confined spaces must be intrinsically safe.

17.3. Rescue Communication:

17.3.1. Attendants must have a two-way radio or telephone/cellular phone capable of contacting the fire alarm communications center or a control center that can immediately contact the fire department in the event of an emergency.

17.3.2. Attendants are responsible for immediately calling the fire department in the event of an emergency.

17.3.3. The fire department must contact the attendant to order the entrant out of the permit-required confined space in the event the fire department must respond to an emergency on or off base.

## **18. Rescues and Emergencies in Confined Spaces.**

18.1. MacDill Air Force Base Confined Space Rescue Team.

18.1.1. The MacDill Air Force Base Fire Department will be responsible for all confined space rescue operations unless the unit has a trained rescue team on site.

18.1.2. All rescue providers shall be First Aid and CPR trained.

18.1.3. Semiannually, the base Fire Department will simulate a variety of confined space rescues with mannequins to keep confined space rescue training current. Organizational rescue teams must conduct quarterly rescue training.

18.1.4. The base Fire Department will conduct their own confined space rescue training.

## 18.2. Confined Space Rescues-General Requirements.

18.2.1. Attendants will at no time enter the confined space to attempt a rescue of personnel. Only non-entry rescues are allowed.

18.2.2. Rescue providers shall be on site for IDLH permit entries and be readily available for all permit-required entries. At no time will a mechanically powered retrieval system, i.e., vehicle or winch, be used to retrieve entrants.

18.2.3. Before entering permit-required confined spaces, entry supervisors and/or attendants will notify the fire department's alarm control center of the:

18.2.3.1. Location of space being entered.

18.2.3.2. Type of space being entered.

18.2.3.3. Type of work being performed in the space.

18.2.3.4. Time contacted.

18.2.3.5. Expected amount of time the permit entry will take.

18.2.3.6. Name of the entry supervisor.

18.2.4. Alarm control center personnel will maintain a log that noted the:

18.2.4.1. Location of space being entered.

18.2.4.2. Type of space being entered.

18.2.4.3. Type of work being performed in the space.

18.2.4.4. Time contacted.

18.2.4.5. Expected amount of time the permit entry will take.

18.2.4.6. Name of the entry supervisor.

## 18.3. Confined Space Emergencies:

18.3.1. Attendants will notify the alarm control center of the location of the space on base and any special conditions associated with the emergency.

18.3.2. The alarm control center will then notify ambulance personnel.

18.3.3. Attendants must prepare for the arrival of the confined space rescue team by:

18.3.3.1. Preparing to tell the on-scene commander details about the confined space.

18.3.3.2. Attendant must keep unauthorized rescuers away from the space. After the fire department arrives, the attendant will be responsible for keeping unauthorized personnel away from the confined space.

18.3.3.3. Informing the on-scene commander of the hazards associated with the confined space and the special conditions associated with the confined space. For instance, the space could have angled floors that are slippery or welding operations could have been going on inside the space before the emergency occurred.



#### 18.4. Non-entry rescue (Permit Entry):

18.4.1. Ensure all entrants are trained to perform self-rescue.

18.4.2. Entrants will wear a full body harness with a D-ring attached to a tripod and winch to facilitate non-entry rescue. The retrieval line will be attached at the center of the person's back near shoulder level.

18.4.3. Wristlets will not be used unless the employer can demonstrate that the use of a chest or full-body harness is infeasible or unsafe and that the use of wristlets is the safest and most effective alternative.

18.4.4. A mechanical device will be available to retrieve personnel from vertical spaces more than 5-feet deep.

18.4.5. The full body harness, tripod, and winch will not be used if the retrieval system would create a greater hazard for the entrant.

18.4.6. Cases where the retrieval system would create a greater hazard for entrants include:

18.4.6.1. The space contains obstructions or turns that prevent pull on the line from being transmitted to the entrant.

18.4.6.2. The entrant could risk contact with projections in the space.

18.4.6.3. An air-supplied respirator would put entrants at risk of airline entanglement with the retrieval line.

18.4.6.4. Retrieval lines would become tangled with a large number of employees in the space at the same time.

18.4.7. When a confined space emergency occurs:

18.4.7.1. The attendant will call for fire and ambulance response.

18.4.7.2. The attendant will immediately retrieve the entrant from the space by use of external rescue equipment.

18.4.7.3. The attendant will assess the entrant's condition.

**NOTE:** The effects of electric shock and some chemical exposures are not immediately apparent. The individual must be examined by a competent medical authority after electric shock, severe falls, chemical overexposure, welding fume overexposure, and any other serious injury.

#### 19. Welding, Cutting, and Brazing in Confined Spaces and Enclosed Areas.

19.1. All confined space entries that require welding, cutting, riveting, and/or brazing will be permit-required confined space entries.

19.2. AF Form 592, **USAF Welding, Cutting, and Brazing Permit**: Whenever workers perform hot riveting, welding, cutting, burning, or heating operations within a confined space, an AF Form 592 must be obtained from the base fire department.

19.3. The welding permit will be maintained with its corresponding entry permit. The welding permit must be placed outside the space next to the confined space entry permit.

19.4. Continuous forced air ventilation will be used while welding, cutting, riveting, and/or brazing in confined spaces.

**NOTE:** Never use pure oxygen to ventilate confined spaces - - flash fire may result.

19.5. If ventilation proves not to be feasible, an air line respirator with at least a 5-minute escape bottle or self-contained breathing apparatus will be used.

19.6. The attendant will ensure proper airflow and proper function of airline units.

19.7. All electrical leads will be inspected for nicks and cuts prior to entry. Any electrical leads that have substantial nicks and cuts will not be used inside the space.

19.8. When arc welding is to be stopped for any substantial period of time, all electrodes shall be removed from the holders and the holders carefully located so that accidental contact cannot occur and the machine is disconnected from the power source.

19.9. Gas cylinders will not be taken into any confined spaces (small propane cylinders are exempt when used in a maintenance operation).

19.10. All hoses used for transferring gas and oxygen for welding, cutting, and burning purposes will be inspected before entering confined spaces and after welding is stopped for any substantial period of time, e.g., lunch breaks, overnight, etc.

19.11. All welding hoses and torches will be removed from the confined space when welding is stopped for a substantial period of time, e.g., lunch, overnight.

19.12. Welding equipment that is mounted on wheels will be chocked to prevent it from rolling.

19.13. Torch valves must be closed and the fuel-gas and oxygen supply to the torch shut off at some point outside the confined space whenever the torch is not to be used for a substantial period of time.

19.14. At no time will a mechanically powered retrieval system, i.e., vehicle or winch, be used to retrieve entrants.

## **20. Ventilation.**

20.1. BES shall approve any ventilation configuration. They also may provide assistance in determining ventilation requirements.

20.2. Pre-planning. The positioning of ventilating equipment is crucial to ensure the confined space is being ventilated properly. The supervisor must truly understand the nature of the confined space in order to properly ventilate it. This can be accomplished by analyzing the following:

20.2.1. Determine if you need to ground or bond the air blower unit. Blower units will generate static electricity. An arc from static electricity could cause an explosion in and around explosive atmospheres.

20.2.2. Determine how large the space is in terms of volume.

20.2.3. Determine the type of atmosphere you are trying to ventilate. For instance, the way you position your duct work depends on whether the contaminants are lighter or heavier than air.

20.2.4. Determine if there is more than one opening into the space.

20.2.5. Determine where the contaminated exhausted air will leave the space. At times, people have placed the intake for their air blower next to the exhaust portal for the confined space. In essence, contaminated air is recirculated back into the confined space.

20.2.6. Determine the shape of the space. This influences the type of directional device and the amount of air pressure needed to ensure that the space can be adequately ventilated.

20.2.7. Determine the clean air source. Do not place the intake in an area that contains contaminated air.

20.2.8. Determine the length of time ventilation is needed. Ventilation may only be needed to purge the space or to provide continuous ventilation.

20.2.9. Determine the type of work that will be performed in the space. If the work produces dust or fumes, local exhaust ventilation is better than general ventilation. If work will be done throughout the space, continuous general ventilation in combination with local exhaust ventilation may be needed to control the atmosphere.

20.3. Improper Ventilating Techniques. Entry supervisors and attendants will ensure the following improper ventilating techniques do not occur.

20.3.1. Recirculation of contaminated exhaust back into the space. This situation occurs when contaminated air is forced out of the space, the ventilation equipment captures the contaminated air, and blows it back into the space.

20.3.2. Short Circuiting the Air Flow.

20.3.2.1. Short circuiting occurs when fresh air moves directly from the inlet into the confined space and to the exhaust outlet without circulating through the other areas of the space.

20.3.2.2. When this occurs, much of the space never gets ventilated because there is no air-flow through it.

DAVID M. SNYDER, Colonel, USAF  
Commander

**Attachment 1****GLOSSARY OF REFERENCES AND SUPPORTING INFORMATION*****References***

AFPD 91-3, *Occupational Safety and Health*

AFOSH Standard 91-25, *Confined Spaces*

29 CFR 1910.146, *Permit Required Confined Spaces*

29 CFR 1910.268, *Telecommunications*

Technical Order 1-1-3, *Inspection and Repair of Aircraft Integral Tanks and Fuel Cells.*